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April 6, 2017

Lynda Deschambault
Remedial Project Manager, Superfund Division
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street, 10th Floor (SFD 7-1)
San Francisco, California 94105

**Subject:** **Proposed 2017 Snowmelt Runoff Monitoring and Modifications to Evaporation Pan Monitoring Program**
Leviathan Mine Site
Alpine County, California

Dear Ms. Deschambault:

Atlantic Richfield Company (Atlantic Richfield) has prepared this letter to propose the 2017 snowmelt sampling program and to respond to the U.S. Environmental Protection Agency's (U.S. EPA's) email request dated March 28, 2017, to collect snowmelt samples during peak snowmelt at the Leviathan Mine Site (site) in Alpine County, California. Additionally, this letter documents proposed modifications to the evaporation pan monitoring program at the site. Snowmelt runoff and evaporation pan data collection are being implemented in accordance with the On-Property Focused Remedial Investigation Work Plan[1] (On-Property FRI Work Plan), or subsequent amendments and letters as noted, and the Reference Area Focused Remedial Investigation Work Plan[2] (Reference Area FRI Work Plan). The On-Property FRI Work Plan and Reference Area FRI Work Plan are being implemented in partial fulfillment of the requirements of the Statement of Work attached to the Administrative Order for Remedial Investigation and Feasibility Study, Comprehensive Environmental Response, Compensation, and Liability Act Docket No. 2008-18 issued by the U.S. EPA on June 23, 2008.

## SNOWMELT RUNOFF MONITORING

At present, the 2017 snowpack is above average at the SNOTEL Monitor Pass monitoring station, and recent field observations by Atlantic Richfield's subcontractors and the Lahontan Regional Water Quality Control Board (LRWQCB) indicate that significant snowpack has accumulated on site.

The main objectives of the snowmelt runoff monitoring program are to:

- evaluate the interaction of snowmelt runoff with disturbed mine materials,
- evaluate sediment erosion by snowmelt runoff, and

[1] Atlantic Richfield, 2010, On-Property Focused Remedial Investigation Work Plan, Leviathan Mine Site, Alpine County, California. Prepared by AMEC Geomatrix, Inc., August 11.
[2] Atlantic Richfield, 2017, Reference Area Focused Remedial Investigation Work Plan, Leviathan Mine Site, Alpine County, California. Prepared by Amec Foster Wheeler Environment and Infrastructure, Inc, January 19.

- collect data to support the feasibility study.

Snowmelt runoff monitoring is conducted at the same locations and using the same equipment as the storm water monitoring program. The sampling equipment is removed and stored at an offsite location at the end of each field season to prevent damage from freezing temperatures. It is re-installed at the beginning of the field season as soon as it is safe to access the monitoring locations.

**Background**

The snowmelt sampling program was designed to provide runoff quantity and quality information during snowmelt events. Snowmelt samples are collected at the beginning of each field season while snowmelt is occurring using automatic samplers programed to collect time-weighted composite water samples. For all snowmelt sampling completed for the remedial investigation (RI) between 2012 and 2016, the automatic samplers at each location have been programmed to collect three, 24-hour composite, flow-proportional samples during a one-week period. The automated samplers typically collect field parameter measurements along with the water samples for laboratory analysis.

The initial scoping for the snowmelt/storm water program was conservative in that many locations were selected to better understand the contribution from different physical features of the site. The monitoring network installed in 2011 consisted of six stations (ST-01 through ST-06) in the Leviathan Creek Study Area (LCSA) and the Pit Study Area (PSA) (Figure 1). Stations ST-01 and ST-04 are located on Leviathan Creek upstream and downstream of the disturbed area of the site, respectively. Stations ST-02, ST-03, ST-05, and ST-06 are located at strategic points throughout the surface water collection system to evaluate relative contributions from features in different portions of the LCSA and PSA. Monitoring stations ST-07 and ST-08 were added in the Aspen Creek Study Area (ACSA) (Figure 1) in 2015 as described in Amendment No. 3[3] to the On-Property FRI Work Plan. Stations ST-07 and ST-08 are located on Aspen Creek upstream and downstream of the disturbed area, respectively.

In 2015, Atlantic Richfield proposed that storm water monitoring for the LCSA and PSA would continue only at stations ST-01 and ST-04 in a letter titled Optimization of Select On-Property Monitoring Programs, Leviathan Mine Site, Alpine County, California[4] (Optimization Letter). This same correspondence established that Atlantic Richfield would attempt to monitor snowmelt in the LCSA and PSA at stations ST-01 and ST-04 (the main samplers) during the 2015 season with optional sampling at stations ST-02, ST-03, ST-05, and ST-06. The U.S. EPA agreed with this approach in its response dated March 23, 2015. Sufficient snowpack was not present on site in 2015 to support snowmelt monitoring; thus, no snowmelt samples were collected. The snowpack in April 2016 was slightly under average (determined via comparison of SNOTEL snow depth at Monitor Pass with historic average SNOTEL snow depth for the same time period); however, a limited amount of snow was present on site at the start of the field season. For this reason, Atlantic Richfield completed snowmelt monitoring in 2016 at stations ST-01 and

[3] Atlantic Richfield, 2012, Storm Water Monitoring Stations—Aspen Creek Study Area On-Property Focused Remedial Investigation Work Plan Amendment No.3, Leviathan Mine Site, Alpine County, California, October 5.
[4] Atlantic Richfield, 2015, Optimization of Select On-Property Monitoring Programs, Leviathan Mine Site, Alpine County, California, February 4.

ST-04 in the LCSA and for the first time, snowmelt samples were collected at stations ST-07 and ST-08 in the ACSA. Because snowmelt samples had not previously been collected at stations ST-07 and ST-08 in 2016, more than three samples were collected (five and four composite samples were collected at stations ST-07 and ST-08, respectively).

**Access Considerations and Re-Installation of Sampling Equipment**

At this time, the LRWQCB and its contractor have removed snow from Leviathan Mine Road and the site access road up to Pond 3, but snow has not been removed from the established roads and trails to the four snowmelt monitoring locations (Figure 1) and only one of the four monitoring locations (ST-07) is adjacent to a road. The other three monitoring locations (ST-01, ST-04, and ST-08) are only accessible by hiking on steep slopes or on trails adjacent to the creek. The road to station ST-07 and the roads that lead to the access trails for the other three locations are still covered in a thick layer of ice and snow, and it will not be safe to access these locations to re-install sampling equipment until more melting occurs or ice and snow can be removed with equipment.

Additionally, setting up the automatic samplers includes the installation of field parameter probes (pH, electrical conductivity, and temperature), sample tubing, and area/velocity sensors into the creek. To properly set up the equipment, personnel are required to enter the creek. Because surface water flows during the spring are anticipated to be the highest observed since RI snowmelt monitoring has been implemented, it may not be safe for personnel to enter the creek and complete the installation of the equipment.

Once 4-wheel-drive vehicle access to the roads that lead to the trails to all four of the monitoring locations is safely possible, Atlantic Richfield will mobilize to attempt to re-install the four main samplers for snowmelt sample collection. The samplers will be programmed to collect 24-hour composite, flow-proportional samples for laboratory analysis and field measurements of water in Leviathan and Aspen creeks during snowmelt. If conditions are encountered where a location cannot be safely accessed, the conditions preventing access will be documented and Atlantic Richfield will return when conditions have improved. Atlantic Richfield will endeavor to install all four samplers as soon as possible; however, all of the sampling equipment may not be installed at the same time and comparable upstream and downstream samples (i.e., stations ST-01/ST-04 and ST-08/ST-07) in the same creek may not be obtained.

**Proposed 2017 Snowmelt Sample Collection**

For the 2017 field season, Atlantic Richfield is planning to collect snowmelt data at each of the four main storm water/snowmelt locations (ST-01, ST-04, ST-07, and ST-08). Atlantic Richfield is not planning to collect snowmelt samples at the four optional locations (ST-02, ST-03, ST-05, and ST-06). All snowmelt runoff from the PSA and LCSA discharges to Leviathan Creek and will flow by station ST-04. As a result, field parameter data and laboratory samples collected at station ST-04 can be used to adequately characterize the potential total effect that snowmelt originating in the areas of the Pit and the LCSA have on RI metals concentrations, pH, electrical conductivity, or temperature in runoff entering Leviathan Creek, which meets the objectives for the snowmelt runoff investigations as cited in the DQOs.

After the 24-hour composite, flow-proportional snowmelt samples are collected at each of the four main locations, the four main automatic samplers will be programmed to collect composite flow-proportional runoff samples triggered by storm water runoff for the remainder of the year as agreed upon by Atlantic Richfield and U.S. EPA in 2015. Laboratory samples collected by the four automated samplers will be submitted to the analytical laboratory for the snowmelt analyses presented on Table 1.

**Response to U.S. EPA's Request to Monitor Snowmelt at Station 17**

In response to the U.S. EPA's e-mail request of March 28, 2017, to monitor snowmelt at Station 17, Atlantic Richfield does not believe installing an automatic sampler at Station 17 (downstream of the confluence of Leviathan and Aspen Creek) is necessary or possible for the following reasons.

- One of the objectives of snowmelt runoff is to evaluate the interaction of snowmelt runoff with disturbed mine materials. Locations ST-04 and ST-07 are downgradient from all areas covered with disturbed mine materials and snowmelt samples proposed by U.S. EPA for Station 17 would be redundant with data already collected upstream.
- Station 17 has never been monitored for snowmelt or storm water before; therefore, neither an automatic sampler nor any of the necessary infrastructure are set-up at this location. Typical automatic sampler station setup consists of a mounted solar panel, rain gauge, bear box installed on concrete pad (to lock and secure the equipment), conduit with wiring between solar panel/rain gauge and bear box, conduit from bear box to creek to house sample collection tubing and water quality sensors, and a stationary post and staff gage installed in the creek to which sensors and water quality probes are secured.
- Snowmelt RI data have not been collected from Station 17 during any previous year's snowmelt sampling effort (2012 through 2016). All 2017 snowmelt data should be comparable to previous year's snowmelt data so that data trends can be evaluated and statistical analysis can be completed.

Atlantic Richfield's surface water monitoring location downstream of the confluence of Leviathan and Aspen Creek is location SW-16. Surface water samples to be collected during the high spring runoff in 2017 are proposed for this location and can be compared to other surface water data collected at location SW-16 from 2012 through 2016. It is also very likely that snow will still cover some of the disturbed mine materials when the sampling of location SW-16 is scheduled in approximately late April or early May.

**EVAPORATION PAN MONITORING**

The main objectives of the evaporation pan monitoring were to:

- support evaluation of pond leakage;
- support evaluation of potential differences in evaporation associated with ponds at higher elevations and varying distance from hillside (i.e., microclimates); and

- support water balance evaluation activities (preparation of a water budget for the site) and the feasibility study.

**Background**

The evaporation pan monitoring program originally consisted of monitoring evaporation rates at three evaporation pans (EVAP-01, EVAP-02, and EVAP-03), which were first installed in 2011 and are shown on Figure 2. Pan EVAP-01 was installed at the HDS/Pond 4 area and pans EVAP-02 and EVAP-03 were installed in the vicinity of Ponds 2N/2S. All three pans measured a change in water level, which was used to calculate an evaporation rate, and were removed from service each winter. In the Optimization Letter, Atlantic Richfield proposed (and U.S. EPA agreed in its letter dated September 11, 2015)[5] to remove pans EVAP-02 and EVAP-03 from service because they were no longer needed to support the evaluation of pond leakage or the evaluation of potential microclimates. As such, pan EVAP-01 has been the only pan operating since 2015 with the intended purpose to collect data to support preparation of the water budget for the site.

**Data Use and Rationale for Modifying the Program**

Preparation of the water budget is ongoing and will be reported later this year as part of the Site Characterization Report. However, evaluation of the suitability of the evaporation pan data to support the water balance has already been completed and several prohibitive issues have been identified with the data collected at pan EVAP-01. The evaporation pan data would have primarily been useful to derive potential evapotranspiration estimates for the main growing season (approximately April through October). Because of limited site access in the early spring months, Atlantic Richfield has been unable to operate the evaporation pan such that it captures the beginning of the growing season. The evaporation pan has been in operation from 2011 through 2016, but the earliest the pan has been able to be placed into service has been May. Data completeness and usability were further compromised by the evaporation pan going dry during long-term site shutdowns due to inclement weather and fire and by snow or ice accumulating in the pan.

Alternative methods to estimate evapotranspiration are available. In lieu of deriving potential evapotranspiration estimates from pan evaporation, Atlantic Richfield intends to develop potential evapotranspiration estimates using a modified version of the Landscape Coefficient Method with a reference evapotranspiration coefficient derived from the California Irrigation Management Information Systems for the Central Sierra Nevada. This methodology will be described in more detail in the Site Characterization Report.

[5] U.S. Environmental Protection Agency, 2015, EPA comments on the Atlantic Richfield Response to U.S. EPA Comments on Optimization of Select On-Property Monitoring, dated April 24, 2015, September 11.

**Proposed Modification to Monitoring Program**

Because the evaporation pan data will not be used to support the water budget and the other objectives have already been met, Atlantic Richfield intends to discontinue evaporation pan monitoring at pan EVAP-01 in 2017.

**CLOSING**

Atlantic Richfield respectfully requests expedited approval of the recommended modifications. Based on current long range forecast, equipment re-installation and snowmelt monitoring would begin in approximately late April or early May 2017.

If you have any questions or comments, please feel free to contact me at (657) 529-4537 or anthony.brown@bp.com.

Sincerely,

Anthony R. Brown
Project Manager, Mining

Attachments: Table 1 – Summary of Proposed 2017 Snowmelt Sample Collection
Figure 1 – Storm Water Monitoring Locations
Figure 2 – Meteorological Station and Evaporation Pan Locations

cc: Gary Riley, U.S. Environmental Protection Agency, Region 9 – via electronic copy
John Hillenbrand, U.S. Environmental Protection Agency, Region 9 – via electronic copy
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Fred Kirschner, AESE, Inc. – via electronic copy

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**TABLE 1**
**SUMMARY OF PROPOSED 2017 SNOWMELT SAMPLE COLLECTION**
Leviathan Mine Site
Alpine County, California

| Parameters | | | Dissolved Metals[1] | Total Metals[1] | TSS | TDS | QC Samples[2] | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Equipment Rinsate Blanks[3] | | Field Duplicates | MS/MSD[4] |
| | | | | | | | Dissolved Metals[1] | Total Metals[1] | | |
| **Method** | | | EPA 200.7/EPA 200.8/ EPA 245.1 | EPA 200.7/EPA 200.8/ EPA 245.1 | SM2540D | SM2540C | EPA 200.7/EPA 200.8/ EPA 245.1 | EPA 200.7/EPA 200.8/ EPA 245.1 | Same as primary samples | Same as primary samples |
| **Containers** | | | 1 x 250 mL HDPE | 1 x 250 mL HDPE | 1 x 1L HDPE | | 1 x 250 mL HDPE | 1 x 250 mL HDPE | | |
| **Minimum Volume** | | | 250 mL | 250 mL | 100 mL | 100 mL | 250 mL | 250 mL | | |
| **Field Filtered[5]** | | | Yes | No | No | | Yes | No | | |
| **Preservative[6]** | | | $HNO_3$ pH>2 | $HNO_3$ pH>2 | None | | $HNO_3$ pH>2 | $HNO_3$ pH>2 | | |
| **Holding Time** | | | 28 d | 28 d | 7 d | | 28 d | 28 d | 7 to 28 d | 7 to 28 d |
| **Study Area** | **Creek** | **Location ID[7,8]** | | | | | | | | |
| **Snowmelt Investigation** | | | | | | | | | | |
| LCSA | Leviathan | ST-01-AUTO | X | X | X | X | | | | |
| LCSA | Leviathan | ST-04-AUTO | X | X | X | X | X | X | | |
| ACSA | Aspen | ST-07-AUTO | X | X | X | X | | | | X |
| ACSA | Aspen | ST-08-AUTO | X | X | X | X | | | X | |
| **Frequency** | | | 3 | 3 | 3 | 3 | 10% | 10% | 10% | 5% |

Notes:

1. Metals are aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, silver, thallium, vanadium, and zinc.
2. QC sample locations are dependent on the actual number of storm or snowmelt samples collected and may need to be adjusted to meet the required frequency of 10% (every 10 samples) for field equipment rinsate blanks, field blanks, and field duplicates, and 5% (every 20 samples) for MS/MSD.
3. Field equipment rinsate blanks are only required for non-dedicated equipment and are analyzed for metals using referenced
4. Three times the original sample volume must be provided to the laboratory for MS/MSDs.
5. Filter samples using a 0.45 micron high capacity filter.
6. Samples should be stored at a temperature ranging from 0°C - 6°C.
7. Approximate sampling locations shown on Figure 1.
8. If the sample is collected using an autosampler, then the -AUTO suffix will be used in the Location ID. If the sample is collected using direct sampling method, then the -AUTO suffix will not be used in the Location ID.

Sample IDs:

| | |
|---|---|
| STWLMMDDYYXX | Use for all storm water, snowmelt, and QC samples collected in the Leviathan Creek Study Area |
| STWAMMDDYYXX | Use for all storm water, snowmelt, and QC samples collected in the Aspen Creek Study Area |

Sample Matrix:

| | |
|---|---|
| STW | Use for all primary and duplicate storm water and base flow samples. |
| SM | Use for all primary and duplicate snowmelt samples. |
| W | Use for all equipment rinsate blanks and field blanks. |

Abbreviations:

% = percent
ACSA = Aspen Creek Study Area
ASTM = ASTM International
d = days
EPA = Environmental Protection Agency
$HNO_3$ = nitric acid
HDPE = high density polyethylene
ID = identification
L = liter
LCSA = Leviathan Creek Study Area
mL = milliliter
MS/MSD = matrix spike / matrix spike duplicate
QA/QC = quality assurance / quality control
RI/FS = Remedial Investigation / Feasibility Study
SM = standard method
TDS = total dissolved solids
TSS = total suspended solids

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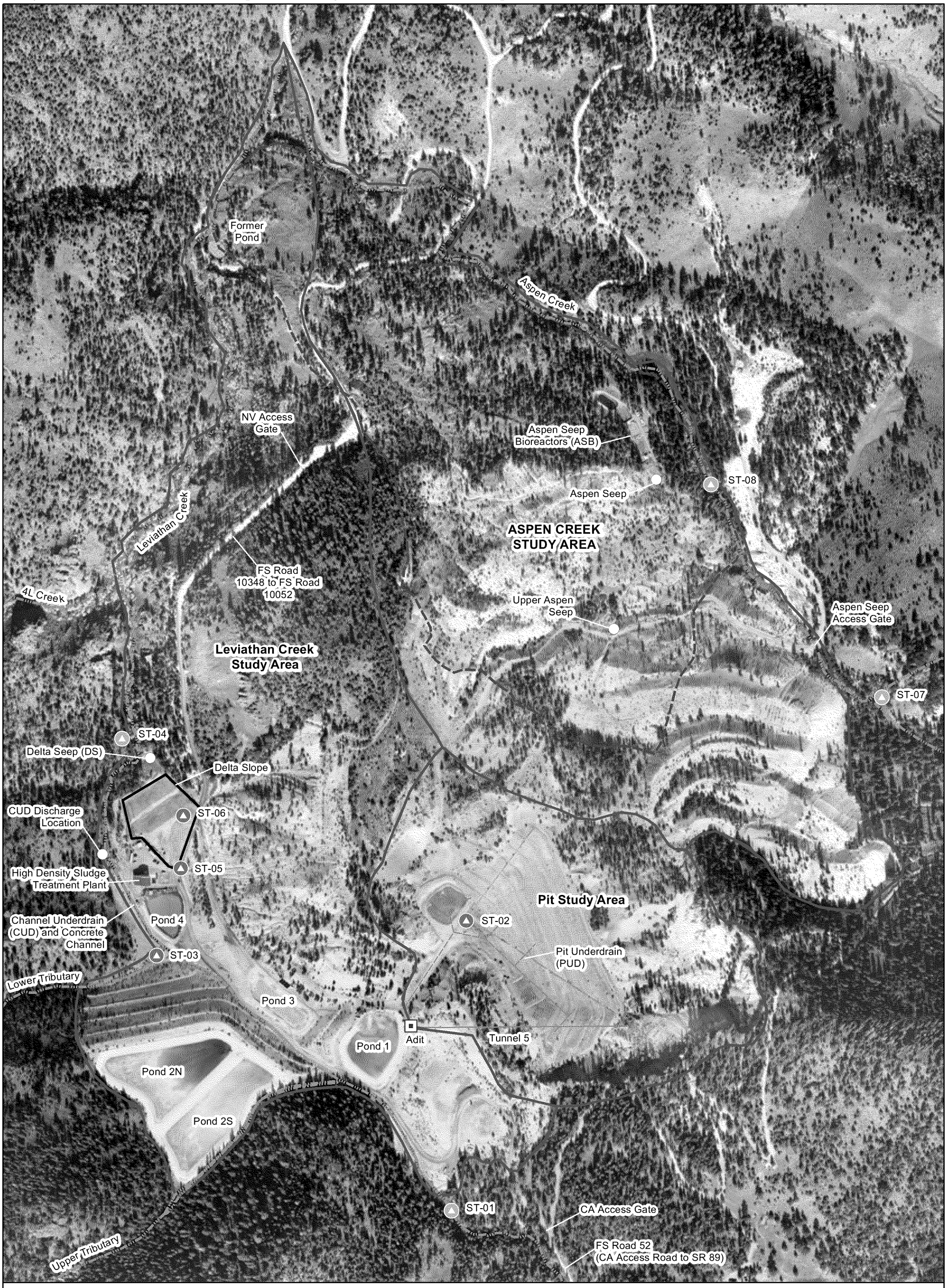


Explanation:

- Existing Storm Water Monitoring Location
- Former Storm Water Monitoring Location
- Discharge Point
- Adit
- Leviathan Creek Basin Landslide
- Creek
- Study Area
- Pit Underdrain Features

Notes:
1. All locations and boundaries are approximate.
2. Base map from aerial photograph dated October 22, 2009.

N

0 500 Feet

STORM WATER MONITORING LOCATIONS
Leviathan Mine Site
Alpine County, California

By: DPV
Date: 03/31/2017

Project No. 0013091

amec foster wheeler

Figure 1

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Explanation:

- Surface Evaporation Rate Monitoring Stations
- Former Surface Evaporation Rate Monitoring Stations
- Meteorological Monitoring Stations

N

0 400 Feet

METEOROLOGICAL STATION AND EVAPORATION PAN LOCATIONS
Leviathan Mine Site
Alpine County, California

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Date: 03/31/2017 | Project No. 0013091

Figure 2